Name:

at1118paper: Complete the Square (v405)

Example

By completing the square, find both solutions to the given equation:

$$x^2 - 54x = -720$$

Add $\left(\frac{-54}{2}\right)^2$, which equals 729, to both sides of the equation.

$$x^2 - 54x + 729 = 9$$

Factor the left side.

$$(x - 27)^2 = 9$$

Undo the squaring. We need to consider both $\pm\sqrt{9}$.

$$x - 27 = -3 \quad \text{or} \quad x - 27 = 3$$
$$x = -30 \quad \text{or} \quad x = -24$$

Question 1

By completing the square, find both solutions to the given equation:

$$x^2 - 10x = -21$$

$$x^2 - 10x + 25 = 4$$
$$(x - 5)^2 = 4$$
$$x - 5 = \pm 2$$
$$x = 3 \quad \text{or} \quad x = 7$$

Question 2

By completing the square, find both solutions to the given equation:

$$x^2 - 30x = 799$$

$$x^2 - 30x + 225 = 1024$$
$$(x - 15)^2 = 1024$$
$$x - 15 = \pm 32$$
$$x = -17 \quad \text{or} \quad x = 47$$

Question 3

By completing the square, find both solutions to the given equation:

$$x^2 - 44x = 1197$$

$$x^2 - 44x + 484 = 1681$$
$$(x - 22)^2 = 1681$$
$$x - 22 = \pm 41$$
$$x = -19 \quad \text{or} \quad x = 63$$

Question 4

By completing the square, find both solutions to the given equation:

$$x^2 - 24x = 112$$

$$x^2 - 24x + 144 = 256$$
$$(x - 12)^2 = 256$$
$$x - 12 = \pm 16$$
$$x = -4 \quad \text{or} \quad x = 28$$

Question 5

By completing the square, find both solutions to the given equation:

$$x^2 + 42x = 1080$$

$$x^2 + 42x + 441 = 1521$$
$$(x + 21)^2 = 1521$$
$$x + 21 = \pm 39$$
$$x = -60 \quad \text{or} \quad x = 18$$

Question 6

By completing the square, find both solutions to the given equation:

$$x^2 + 24x = 697$$

$$x^2 + 24x + 144 = 841$$
$$(x + 12)^2 = 841$$
$$x + 12 = \pm 29$$
$$x = -41 \quad \text{or} \quad x = 17$$